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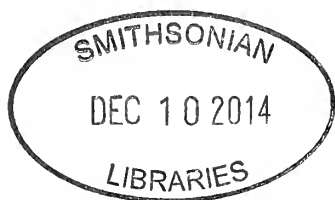
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American Association of Zoo Keepers, Inc.

The American Association of Zoo Keepers, Inc. exists to advance excellence in the animal keeping profession, foster effective communication beneficial to animal care, support deserving conservation projects, and promote the preservation of our natural resources and animal life.

About the Cover

This month's cover features silvered leaf monkeys, or silvered langurs (*Trachypithecus cristatus*) photographed by Robert W. Mendyk, Research Associate of the Smithsonian National Zoological Park's Department of Herpetology, in Bako National Park, Sarawak, Malaysian Borneo. As part of a clade of more than 15 species of leaf monkey distributed throughout Southern and Southeast Asia, *T. cristatus* occurs in western Peninsular Malaysia, on Borneo and Sumatra, and on several offshore islands and island groups. *Trachypithecus cristatus* is currently listed by the IUCN as nearly threatened; however, very little is actually known about its population status outside of Peninsular Malaysia.

Trachypithecus cristatus is highly arboreal and found in a variety of primary and secondary forest habitats ranging from mangroves to montane forests, rarely straying far from bodies of water. Its diet is comprised predominantly of leaf matter, although some fruits, seeds and flowers may also be taken. *Trachypithecus cristatus* live in large harem-based, matrilineal groups, which can range up to 40 individuals. The vernacular name, silvered langur, refers to the silver fur coloration of adults; however, neonatal *T. cristatus* are born with orange fur, which gradually fades to silver within a few months.

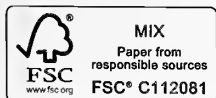
Trachypithecus cristatus may be exploited locally through hunting and collection for pet markets; however, the greatest threat facing the species is habitat destruction, specifically the clearance of forests for oil palm plantations. The forceful expansion of oil palm cultivation throughout Southeast Asia remains one of the greatest burgeoning threats to the region's biodiversity, particularly on Borneo and Sumatra and in other areas with high levels of endemism. While *T. cristatus* appears to be one of the least-threatened of the langurs at the moment, nine other species are currently listed as endangered or critically endangered.

Articles sent to **Animal Keepers' Forum** will be reviewed by the editorial staff for publication. Articles of a research or technical nature will be submitted to one or more of the zoo professionals who serve as referees for **AKF**. No commitment is made to the author, but an effort will be made to publish articles as soon as possible. Lengthy articles may be separated into monthly installments at the discretion of the Editor. The Editor reserves the right to edit material without consultation unless approval is requested in writing by the author. Materials submitted will not be returned unless accompanied by a stamped, self-addressed, appropriately-sized envelope. Telephone, fax or e-mail contributions of late-breaking news or last-minute insertions are accepted as space allows. Phone (330) 483-1104; FAX (330) 483-1444; e-mail is shane.good@aazk.org. If you have questions about submission guidelines, please contact the Editor. Submission guidelines are also found at: aazk.org/akf-submission-guidelines/.

Deadline for each regular issue is the 3rd of the preceding month. Dedicated issues may have separate deadline dates and will be noted by the Editor.

Articles printed do not necessarily reflect the opinions of the **AKF** staff or the American Association of Zoo Keepers, Inc. Publication does not indicate endorsement by the Association.

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ANIMAL KEEPERS' FORUM

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Animal Keepers' Forum is published monthly by AAZK, Inc. Ten dollars of each membership fee goes toward the annual publication costs of *Animal Keepers' Forum*. Postage paid at Tucson, AZ.

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AAZK Leadership

There is no secret handshake, no decoder ring and there certainly is no mystery behind the offices of AAZK's Board of Directors. Quite simply, your Board works for the Association, helping to guide and lead AAZK towards our vision of becoming the leader in the zoo and aquarium industry fostering professional development and personal connections that advance animal care, animal welfare and conservation. It's not rocket science; just dedication, commitment, and vision.



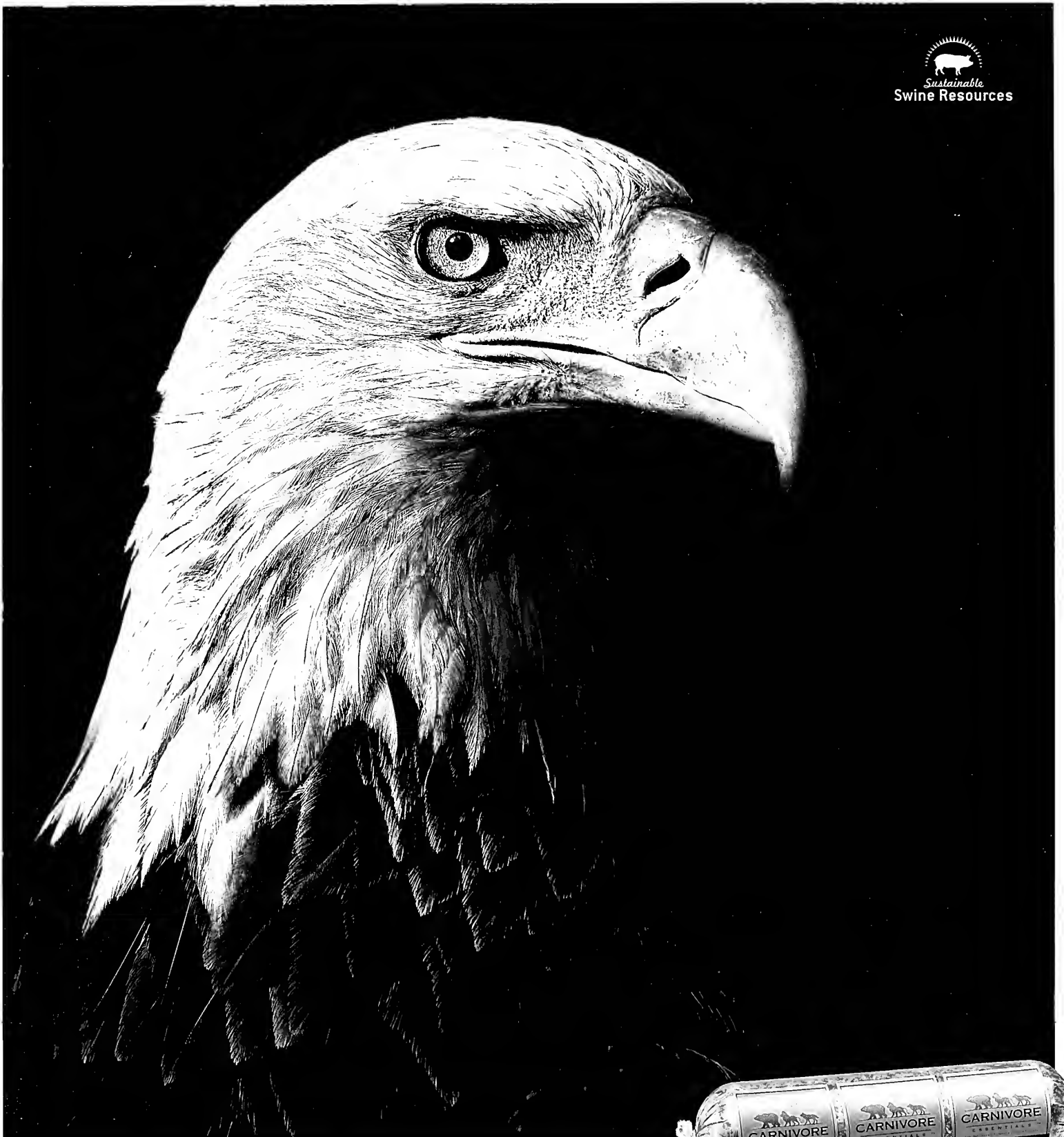
Being on the Board of Directors for our Association is an honor and calling. It is not as some might assume, an overwhelming tenure of responsibility. It does however, have its idiosyncrasies. Here are a few things that you might anticipate as a Board member:

- Mandatory attendance at our annual meetings (just prior to the conference)
- Attendance at our Board Mid-Year meetings
- Monthly e-meetings (via a living document) with the Board and staff
- Oversight of one of the Association Divisions (Education, Conservation, Communication, and Recognition)
- Electronic voting and ratification when required
- Regular correspondence with assigned committee chairs
- Committee project management
- A deep commitment to communication

We have Board elections coming up in early 2015. If you are interested in making a profound impact on both our Association and profession, or have a combination of leadership skills, positive energy, and a joy for task management, and have experience as a leader at the Chapter level (highly recommended), please consider running for the Board of Directors. We are in the midst of making great strides in our profession and hope that you will accept the challenge to run for the office of the Board of Directors.

Please do not hesitate to e-mail me if you are interested in learning more about what it means to be on the Board of Directors. E-mail me at bob.cisneros@aazk.org ; I would love to hear from you.

Bob Cisneros



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February 18-21, 2015
**23rd Annual International
Association of Avian Trainers
and Educators Conference**
Charlotte, NC
Hosted by Carolina Raptor
Center. More information can
be found at iaate.org.

March 21-27, 2015
AZA Mid-Year Meeting
Columbia, SC
Hosted by Riverbanks Zoo and
Garden. For more info go to:
aza.org/midyearemeeting

April 7-9, 2015
**Bear Care Workshop for Zoo
Professionals**
Tucson, AZ. Hosted by Reid
Park Zoo. For more information
and Call for Papers visit:
[reidparkzoo.org/events/public/
professional-workshop-zoo-
keepers/](http://reidparkzoo.org/events/public/professional-workshop-zoo-keepers/)

April 13-18, 2015
**Animal Behavior Management
Alliance (ABMA) Conference**
Copenhagen, Denmark
For more information visit:
theabma.org.

June 1-5, 2015
**Prosimian TAG Meeting and
Workshop**
Myakka City, FL
Hosted by The Lemur
Conservation Foundation
For more information contact
Alison Grand at:
agrand@lemurreserve.org.

June 14-18, 2015
**International Rhino Keepers'
Workshop**
Chester, England
Hosted by Chester Zoo
For more information and Call
for Papers, go to:
[rhinokeeperassociation.org/
rhino-keeper-workshop/](http://rhinokeeperassociation.org/rhino-keeper-workshop/)

September 9-13, 2015
**International Congress on
Zookeeping**
Leipzig, Germany
Hosted by Leipzig Zoo and
the International Congress of
Zookeepers (ICZ).

For more information visit:
iczoo.org.

September 17-21, 2015
AZA National Conference
Salt Lake City, UT
Hosted by Utah's Hogle Zoo
For more information visit:
aza.org.

November 4-8, 2015
**New World Primate TAG
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San Diego, CA
Hosted by San Diego Zoo
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More details to come....



September 27 - Oct. 1, 2015
AAZK National Conference

St. Louis, MO
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AVAILABLE GRANTS

So you don't have enough funding to cover the conference, research or conservation project you would like to do? Well, look no further! AAZK offers three exciting grants to help you grow in your career as a zoo keeper. Applications and guidelines for each grant can be found on the AAZK website. The deadline for all three grants is March 1 so start planning now so you won't miss your chance to apply. If you have questions, please contact Jessica Munson at jessica.munson@aazk.org.

☐ **THE AAZK PROFESSIONAL DEVELOPMENT GRANT**

The AAZK Professional Development Grant is designed to assist AAZK members with costs associated with attending professional meetings or workshops, or, participating in field research. There is a total of \$2000 for this grant; amount can be divided among applicants. Deadline is March 1.

Qualifications: Full-time keepers/aquarists in zoological parks and aquariums, who are professional members of AAZK, Inc. in good standing, are eligible to receive grants.

☐ **THE AAZK RESEARCH GRANT**

The purpose of the AAZK Research Committee's Zoo Keeper Grant in Research is to encourage and support efforts in non-invasive research conducted by AAZK members in zoological parks and aquariums around the world. There is a total of \$2000 for this grant; amount can be divided among applicants. Deadline is March 1.

Qualifications: Full-time keepers/aquarists in zoological parks and aquariums, who are professional members of AAZK, INC. in good standing, are eligible to receive grants. Researchers other than zoo keepers may participate in the funded studies. The principal investigator, however, must be a keeper/aquarist.

☐ **THE AAZK CONSERVATION, PRESERVATION AND RESTORATION GRANT**

The purpose of the AAZK CPR Committee's Zoo Keeper Grant in Conservation is to encourage and support efforts in conservation conducted by AAZK members in zoological parks and aquariums around the world. There is a total of \$1000 for this grant, amount can be divided among applicants. Deadline is March 1.

Qualifications: Members of the AAZK in good standing are eligible to apply and receive grants. The member must have an active role in the conservation effort submitted for consideration. Because of the nature of conservation projects, the scope of the project or number of people involved will not be restricted.

CALL FOR NOMINATIONS

AAZK Board of Directors

The American Association of Zoo Keepers (AAZK) is seeking nominations for three (3) positions on the AAZK Board of Directors. Each candidate shall be nominated by a Professional peer within AAZK. Qualified candidates shall be active Professional Members in good standing with AAZK. Association Bylaws require that a Board Member have the title of Animal (Zoo) Keeper or similar and if in a supervisory role at their facility, maintain daily husbandry contact with the animal collection. AAZK reserves the right to contact the candidate's employer to verify candidate job duties to conform to AAZK policy. The electronic voting period to elect Board Members to the Association will be open from **April 15 to June 1, 2015** on the AAZK website.

Preferred Experience:

Experience as an officer in an AAZK Chapter, Committee Chair, or Conference Chair. Excellent organizational and time management skills, coupled with the ability to meet tight deadlines; problem solving and motivation of subordinates and quality public speaking skills.

Requirements:

Each elected candidate shall be required to attend monthly electronic meetings of the AAZK Board of Directors, read and answer daily electronic communications, supervise the work of Committees and/or Program Managers and shall be required to attend the annual AAZK Conference. An elected candidate can expect to commit anywhere from 2-4 hours per week in the performance of AAZK Board duties.

Nominations:

A Letter of Nomination shall include:

- Name of Candidate
- Zoo Affiliation
- Zoo Position Title
- Contact Information (address) including a phone number
- E-mail address

The Letter of Nomination shall include a brief synopsis of candidate work history, previous experience within AAZK and detail the number of years within the Profession. Deadline for Nominations to the AAZK Board of Directors shall be postmarked or e-mailed prior to midnight February 28, 2015.

Nominations can be sent to Ed.Hansen@aazk.org or mailed to:

Ed Hansen, CEO/CFO
AAZK
8476 E. Speedway Blvd., Suite 204
Tucson, AZ 85710-1728

REMINDER

AAZK Professional Members AAZK Board of Directors Electronic Voting

Candidate profiles for election to the AAZK Board of Directors may be viewed at www.aazk.org beginning **April 1, 2015**.

Professional Member electronic voting for candidates to the AAZK Board of Directors will open on the AAZK website (www.aazk.org) on **April 15, 2015** and will close at midnight **June 1, 2015**.



Cooperative Care and Social Development in Juvenile Cotton-Top Tamarins

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ABSTRACT:

Cooperative care of young is common in Cotton-top Tamarins (CTT). Female CTT often give birth to fraternal twins who are carried by and interact with parents as well as with related and unrelated helpers. Scan sampling was used to investigate social interactions of pairs of juvenile siblings in a group of captive CTT at the Milwaukee County Zoo in two consecutive years. The data from both years were compared to examine how parental and sibling interactions and carrying behaviors changed as the juveniles aged, and the effect that number of caregivers (parents and siblings) may have had on these behaviors. There were five caregivers the first year and nine caregivers the second year. Our results indicate: 1) the proportion of parental interactions decreased while the proportion of sibling/twin interactions increased as the juveniles aged both years, 2) the proportion of time spent being carried decreased as the juveniles aged both years, and 3) group size may impact the carrying responsibilities of fathers more than mothers.

INTRODUCTION:

Cooperative breeding is a form of parental care in which group members other than

the infant's biological parents assist in raising young that are present in the group. Typically, the mother, father, older siblings, and sometimes unrelated helpers are involved in carrying, feeding, and interacting with the infants (Kostan & Snowdon, 2002). When the young are related to the helpers, an indirect fitness advantage is gained by the helpers because their assistance typically improves the reproductive success of relatives (Bergmüller et al., 2007). Another benefit of cooperative breeding is that in the event that one of the parents in the group becomes unable to provide care to their offspring, other caregivers are present and able to compensate for their absence and continue to raise the young in the group (Kostan & Snowdon, 2002). Among mammals, cooperative breeding has been observed in a range of species including mongooses, meerkats, African jackals, sperm whales (Zahed et al., 2010), wolves, naked mole rats, and a range of primates (Kostan & Snowdon, 2002). Cooperative breeding is believed to increase the cognitive abilities of human and nonhuman primates (Burkart & van Schaik, 2010). Cooperative parenting methods are learned through experience and are essential for infant survival (Cawthon Lang, 2005). As such, studying

cooperative rearing may also lead to knowledge that will contribute to the conservation of animals in the wild, as well as welfare of these animals in captivity (Zhao et al., 2008).

Cooperative infant care is commonly observed in primate species and is especially common in the callitrichidae family, which includes marmosets and tamarins. In the wild, group sizes for callitrichids most commonly range from three to nine individuals with at least one breeding pair, their offspring and other unrelated individuals. In captivity, the groups are typically related (Zahed et al., 2010). The dominant breeding pair of the group will have one or two sets of twins per year (Zahed et al., 2010) and group members will provide varying levels of care to all of the young in the group regardless of the degree of kinship between them (Dietz, 2004).

In Cotton-top Tamarins (CTT), cooperative care is observed in the wild as well as in captivity; however, more data are available on captive CTT due to the fact that they are an endangered species found only in northwest Columbia. Several patterns have emerged across the range of studies completed on CTT. Cooperative breeding

is beneficial to CTT because it increases the infant's chances of survival and decreases the fitness cost to the breeding pair, allowing them to reproduce multiple times in their lifetime (Price, 1992a). However, individuals that aid in raising non-kin can experience fitness costs, especially in the wild. When carrying an infant, CTT have been observed to be less active, spend more time hiding and less time feeding and interacting socially. They also spend more time and energy watching for dangerous and difficult situations to arise when carrying young (Price, 1992b). Conversely, helpers benefit by being part of a larger group of CTT, which protects them from predators. Also, when there are more individuals in a group, each helper can share less food with juveniles and spend less of their time providing care (Price, 1992a). Cooperative care includes several responsibilities such as carrying the young and providing food and protection; however, group members do not share all of the responsibilities equally.

Infants are typically carried 100% of the time during the first four weeks postpartum. This decreases over the next eight weeks until the infants are almost completely independent by week twelve (Kostan & Snowdon, 2002). It has been reported that the mother is the primary carrier during the first two weeks postpartum as she is the only one capable of nursing the infants. The father begins to play a larger role in carrying the young between two and four weeks postpartum, and siblings after week four (Zahed et al., 2010). As the CTT age, the mother, father, siblings and other helpers will share solid food with the young. It has also been observed that juveniles are most likely to engage in social play with their twin or siblings of the nearest age while the father and older brothers are most likely to provide protection (Kostan & Snowdon, 2002).

Cooperative care of two sets of twins in the same family group of CTT at the Milwaukee County Zoo was studied over two consecutive years. In 2011, we investigated how the carries and interactions changed between the twins and their mother, father, and three siblings after the twins reached 13 weeks of age. In 2012, we studied how the carries and interactions changed between another set of twins and their mother, father, and seven siblings from the time they were six-weeks and five-days-old to the time they were 11-weeks-old. We hypothesized that as the juveniles aged,

the proportion of time spent interacting with parents would decrease and the proportion of time spent interacting with siblings/twin would increase, and that the proportion of time spent being carried would decrease over time. In addition, we examined whether group size affects the carrying behaviors of the mother, father, or siblings.

METHODS:

The CTT family group observed was housed within the Small Mammal Building at the Milwaukee County Zoo, Milwaukee, WI. During the fall of 2011, the two CTT we observed were born on July 3, 2011 and were studied from 13 weeks through 19 weeks of age. One was a male and one was a female. At this time the CTT family consisted of the parents, the twins, and three older siblings. The twins studied in the fall of 2012 were born on August 25, 2012. These twins were studied from 6 weeks through 11 weeks of age. The twins were too young for their sex to be determined during the course of this study; however, after this study concluded, both juveniles were determined to be females. At this time the CTT family consisted of the parents, the twins, and seven older siblings as two additional males were born in February, 2012. Prior to each study, a description of each animal was provided by the keepers to distinguish each parent from the siblings. Siblings were not distinguishable from one another.

The exhibit that housed the family group contained many branches for climbing and perching, and a large, artificial tree trunk in the center. The top of the artificial tree contained a flat perch near the ceiling, parts of which were out of sight. Two wooden cubbies were present on either side of the exhibit. Various enrichment items were present over the course of the study; including a hanging hollow cloth triangle, a rope hoop, etc. Areas for food dishes were present on both sides of the exhibit; however, food was not provided constantly. Slow flowing

drinking water was also provided on both sides of the exhibit. The rear wall was composed of one large window, through which outdoor trees could be seen.

Scan sampling of each juvenile was used to record who was carrying the juvenile, and with whom the juvenile was interacting, at 30 second intervals following Kostan et al. (2002). By using scan sampling, the observers had adequate time to accurately determine with whom the juveniles were interacting. One researcher observed one juvenile CTT during each data collection session. Each juvenile CTT was observed for an equal amount of time during each observation period. Our ethogram contained categories of interaction with mother, father, twin, siblings, and self as well as multiple interactions between different combinations of group members, such as mother and sibling, etc. (Table 1). If the juvenile was being carried, it was recorded as being carried by and interacting with the individual doing the carrying.

To standardize observations within years, researchers observed the same individual at the same time for three sessions across the course of the study and compared data for each session. These observations were analyzed to be sure that an interobserver reliability greater than 0.85 was met for both years.

For each observation session, the number of intervals, the number of carries by each individual, and the number of interactions with each group member were totaled between the two observers. To determine the proportion of time spent interacting with parents and siblings/twin, the number of interactions with the mother and father were added together and the number of interactions with the sibling and twin were added together. Each sum was then divided by the total number of intervals. The number of carries were divided by the total number of intervals to determine the proportion of

Table 1: Ethogram of CTT behaviors recorded in this study.

Interaction with other member of group	Any behavior that involves another member of the group (i.e. running after/in front of another individual, grooming, feeding, etc).
Multiple Interactions	When the juvenile is interacting with more than one group member at a time (i.e. mother and sibling).
Solitary	The individual is not interacting with another member of the group.
Being Carried by	Whatever individual the juvenile is physically on/attached to.
Out of sight	The juvenile was out of sight. Carrying and interaction data could not be collected.
Other	The behavior observed was not listed above.

time spent being carried. The proportion of time spent being carried by each group member was determined by dividing the number of carries by each group member (mother, father, or sibling) by the total number of carries. At the end of the study, the values for proportion of time spent being carried were averaged for each group member to determine the primary carrier of the juveniles. The data on the juveniles' interactions with parents and siblings/twin were fit to linear regressions and data on the proportion of time spent being carried were fit to an exponential regression.

Because researchers only observed the CTT from the public viewing area, and no items were added to the exhibit by researchers at any time, there were no ethical concerns associated with this study.

RESULTS:

Over the course of the 2011 study, when the twins were 13+ weeks of age, the proportion of time the juveniles interacted with their parents decreased while the proportion of time the juveniles interacted with their siblings/twin increased (Figure 1). The same patterns were observed in the 2012 study when the twins were 6-11 weeks of age (Figure 1). As expected, the proportion of time spent interacting with parents in the 2011 study was typically much lower than in the 2012 study as the juveniles were older. Additionally, the rate at which parental interactions decreased was greater in the 2012 study than in the 2011 study. At the beginning of the 2012 study, the juveniles' interactions with the mother included carrying and nursing behaviors, whereas toward the end of the study, the interactions with the mother were typically limited to nursing behaviors.

There appeared to be no change in the number of carries for both juveniles over the course of the 2011 study (Figure 2). The number of carries stayed relatively low over time, except for at 122 days of age, where the juveniles were carried for nearly the entire observation period. The proportion of time spent being carried decreased over the course of the 2012 study (Figure 2). At the beginning of the 2012 study, juveniles were rarely off of

the backs of carriers. Near the end of the study, more often than not, the juveniles were observed to be independent of carriers.

In 2011, the mother was determined to be the primary carrier as the average proportion of time spent being carried by the mother was the highest ($64.0\% \pm 48.5\%$). The siblings provided an intermediate amount of carrying ($26.9\% \pm 42.4\%$), and the father spent the least average proportion of time carrying the juveniles ($11.1\% \pm 33.3\%$; Figure 3). In 2012, the siblings were collectively determined to be the primary carriers as the average proportion of time spent being carried by siblings was the highest ($62.8\% \pm 35.9\%$). The mother provided an intermediate amount of carrying ($36.8\% \pm 35.9\%$), and the father again spent the least average proportion of time carrying the juveniles ($0.2\% \pm 0.5\%$; Figure 3).

DISCUSSION:

As predicted, over the course of both studies, parental interactions decreased while sibling/twin interactions increased as the juveniles aged. There were differences in the starting point of proportion of time spent interacting with parents and the rates at which these interactions decreased, presumably due to the age of the juveniles (Kostan et al., 2002). Although the proportion of time spent interacting with siblings increased both years, the overall proportion of time spent interacting with siblings was lower in the 2011 study, likely because there were fewer siblings with whom the twins could interact.

As expected, the proportion of time spent being carried decreased as the juveniles aged. This is consistent with a study done by Kostan et al. (2002) that observed CTT from birth to 20 weeks and witnessed infants being carried the majority of the time from birth to four weeks, infants being carried only around 50% of the time by eight weeks, and near independence of the juveniles by twelve weeks. The proportion of time spent being carried decreased more significantly in the 2012 study, when the juveniles were 6 to 11 weeks old, than in the 2011 study where the juveniles were over 13 weeks old. In the 2011 study, the proportion of time spent being carried likely remained low because at this stage in juvenile CTT

Figure 1. In both 2011 (triangles) and 2012 (circles) the proportion of time spent interacting with parents (open symbols) decreased and the proportion of time spent interacting with siblings/twin (filled symbols) remained high and increased, as the juveniles aged (2011 sibling/twin: $y = 0.003x - 0.23$, $R^2 = 0.2$; 2011 parents: $y = -0.003x + 0.35$, $R^2 = 0.65$; 2012 sibling/twin: $y = 0.002x + 0.36$, $R^2 = 0.04$; 2012 parents: $y = -0.008x + 0.67$, $R^2 = 0.24$).

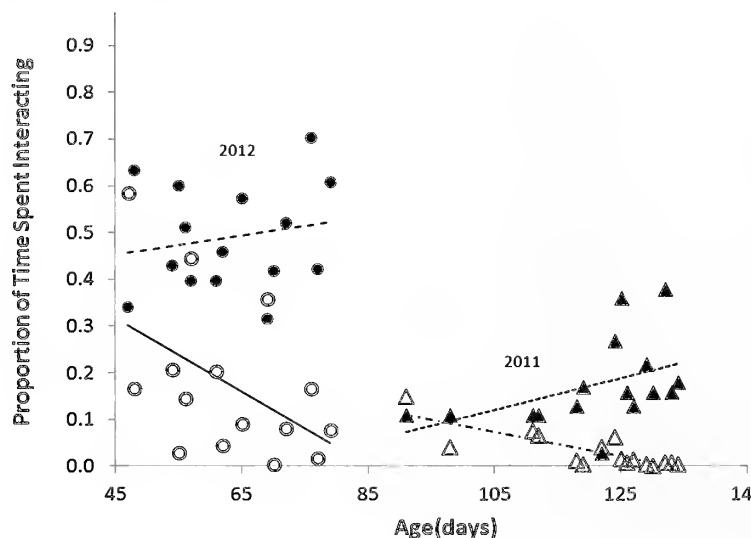
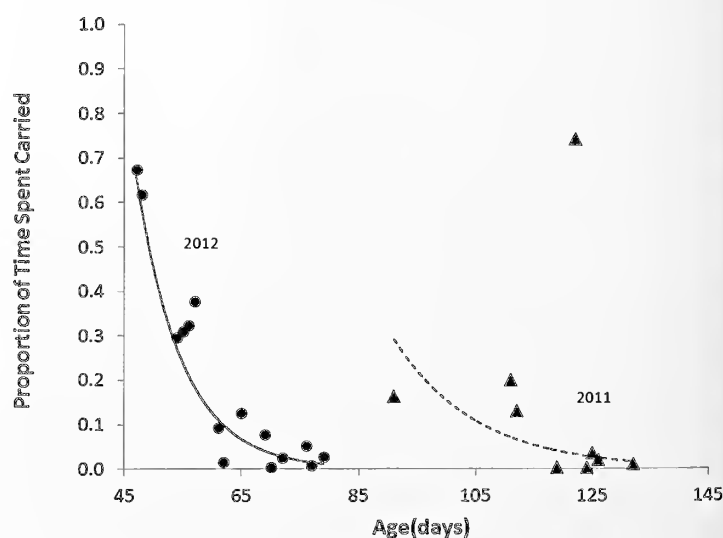


Figure 2. The proportion of time spent being carried decreased exponentially as the juveniles aged in both 2011 (triangles; $y = 183.3e^{-0.07x}$ $R^2 = 0.22$), and 2012 (circles; $y = 258.4e^{-0.13x}$ $R^2 = 0.67$).



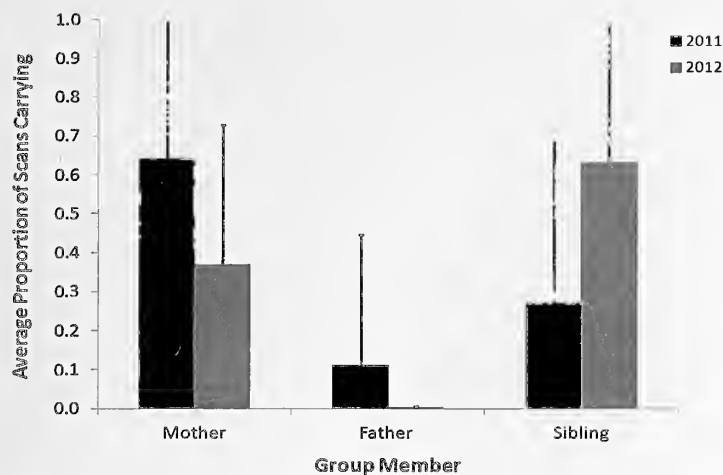


Figure 3. In 2011, the mother was the primary carrier, followed by the siblings, with the father providing the least amount of carrying. In contrast, in 2012, when the twins were younger, the siblings were the primary carriers, followed by the mother, with the father providing the least amount of carrying. Error bars represent one standard deviation.

development, carrying does not occur as frequently (Kostan et al., 2002; Mills et al., 2004).

The primary carriers were not consistent between the two studies. The father played a larger carrying role in the 2011 study than he did in the 2012 study. This is significant because the 2012 group was larger than the 2011 group, suggesting that group size may impact paternal interactions, but have less of an influence on maternal interactions due to the obligatory nursing role. This is consistent with the findings of a study done by Price (1992a), which studied CTT with two to twelve siblings present in the group. Price found that infant care from birth to 12 weeks was affected by group size: as family size increased, the infants were carried more often, sibling care increased, paternal care decreased, and maternal care was not affected. Additionally, given that the juveniles were just less than seven weeks old at the beginning of the study, the siblings' role as the primary carriers in the 2012 study is supported by a study done by Zahed et al. (2010) that observed CTT from birth to eight weeks. They found that when the juveniles were three weeks of age, sibling carries began to increase and once the juveniles reached four weeks of age, parental carries declined. Therefore, after four weeks of age, one would expect siblings to be the primary carriers.

Since the CTT observed in each study were unmarked and observers could not differentiate between most of the siblings, it is possible that the mother could have provided more carries than any one sibling in the 2012 study. The mother carried the juveniles more often than any one of the seven siblings in the 2012 study; however, two of the identifiable female siblings (Lyra and Gorilla) carried the juveniles a substantial portion of the time. Since the identities were not recorded for each sibling that was carrying a juvenile, we cannot directly compare how the proportion of carries by the mother compared to the individual proportion of carries by each sibling.

Future studies should examine in more detail how group size affects the interactions and care provided by group members. It is important to observe how parental care of a breeding pair varies across different litters. After observing the behaviors of the mother and father in each study, we are interested in whether the amount of parental care decreases with each


successive litter. It would be beneficial to perform observations on a group of CTT in which each individual is marked or otherwise individually recognizable.

Overall, the investigators were able to make several final conclusions after observing the interactions of this group of CTT across two consecutive years. The resulting data indicate that as the juveniles aged, the proportion of parental interactions decreased, while the proportion of sibling/twin interactions increased. As expected, the proportion of time spent being carried decreased as the juveniles aged both years. Finally, partially attributed to the mother's obligatory nursing role, the group size may impact the paternal, but not maternal, carrying role as the father was a more active carrier with the smaller group size in 2011. This study supports previous research and serves as a definitive resource to further understand the dynamics of cooperative breeding among captive CTT.

ACKNOWLEDGEMENTS

We appreciate the assistance of the staff of the Small Mammal House, especially Ms. Rhonda Crenshaw, without which this project would not have been possible. We also appreciate the Milwaukee County Zoo for supporting the research training program in Behavioral Ecology at Carroll University.

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Getting to Know the Neighbors:

Building Professional Relationships with a Nearby Facility via an AAZK Member Exchange

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Two goals identified in the AAZK mission are to advance excellence in the animal keeping profession and foster effective communication beneficial to animal care. Chapters have embraced these goals by providing their members with opportunities to engage in educational meetings, lectures, and conferences. However, exchanging ideas between Chapters on a consistent basis is an often underutilized tool for professional development. The National Capital Chapter (NCAAZK) and Greater Baltimore Chapter (GBAAZK) established a working relationship that, among other benefits, led to an enlightening keeper exchange program between members of the two Chapters.

In early 2012, Smithsonian National Zoological Park (SNZP) keeper Kenton Kerns, who is President of NCAAZK and a Small Mammal House keeper, broached the idea of working together on some sort of institutional exchange. Kenton approached GBAAZK Treasurer Lindsay Jacks, a former SNZP employee and current volunteer, with the idea of a keeper exchange between the two facilities. The timing of the proposal was impeccable as GBAAZK had chosen to focus its 2012 year on improving professional development. Lindsay presented the idea to GBAAZK and members naturally expressed their interest. The idea was fun and exciting for a variety of reasons, but most importantly it created a perfect opportunity for GBAAZK to provide a valuable professional development experience.

MZiB keeper assists with Giant Pacific Octopus feeding at SNZP invertebrate building (Credit: MZiB staff)



GBAAZK President Bethany Wlaz reached out to Kenton via e-mail and expressed interest in pursuing the endeavor. As fate would have it, the two presidents met in Syracuse at the 2012 AAZK National Conference. In addition to sharing the woes, triumphs, and future goals of their respective Chapters, Bethany and Kenton quickly realized that they were on the same page and seeking the same experience via an exchange program. Both identified the importance of keepers and AAZK members networking with one another, especially between two institutions so geographically close, about one hour driving distance apart. Additionally, it was hoped that keepers would gain valuable insight in touring a different facility and getting a behind-the-scenes look at programs both familiar and foreign to their expertise. The exchange would also be an excellent way to kick off a long term relationship that could create a partnership for future fundraisers, conservation efforts, social outings, and information exchange.

Both presidents approached senior management with the proposal for the exchange. Each facility responded with excitement and support of the idea and approved the exchange. Both The Maryland Zoo in Baltimore (MZiB) and SNZP encouraged keepers to forge connections with another facility in the area. To ensure that the trips would be beneficial to fellow keepers, each facility provided an in-depth experience tailored to those in the profession. To achieve this, a variety of activities including training/enrichment demos, hands-on work, and general touring and discussion was offered.

MZiB General Curator Mike McClure stated his reason for supporting the exchange proposal:

"I thought it was a great chance for people to see other sides of their chosen profession and to get other people's perspectives. I thought that our staff would be able to get new information and ideas out of the interaction to enhance their own work. I also was excited that our staff would have the chance to display some of their own skills and accomplishments, which always helps people develop more pride in their work."

SNZP Curator Steve Sarro gave his thoughts on the keeper exchange:

"Keeper exchanges are vital in the zoo business. These easy, inexpensive opportunities facilitate networking, enhance cooperation and professionalism and, lastly, foster creative thinking and problem-solving when the keepers return home."

Furthermore, since the endeavor was so closely tied to the missions of the zoos, keepers were urged to attend the exchange while "on the clock." Once the final logistics such as liabilities, policies and scheduling were worked out, the exchange was ready to kick off.

The plan was made for groups to travel to the designated facility in groups of 3-5 on three separate days. Each day would have scheduled behind-the-scenes tours of various areas with time available for walking the zoo and a lunch with fellow keepers. Tours would focus on training, enrichment, and unique facts and/or species. Keepers were given the opportunity to share their accomplishments, struggles, methods, stories and passion with their neighboring Chapter.

In the first round of the exchange members of GBAAZK traveled to SNZP in January and February of 2013. Tours at the SNZP encompassed the Asia Trail, Small Mammal House, Bird House, Reptile Discovery Center, Invertebrate Building, African Savanna, and Great Cats.



1) SNZP staff interacts with a Chinese Alligator at MZiB's Animal Embassy (Photo by SNZP staff)



2) A white rhino training demonstration by MZiB keepers (Photo by SNZP staff)

MZiB keepers highlighted many aspects that they found most beneficial and enjoyable about the exchange. Among them was the sharing of knowledge and husbandry practices for those species housed by both institutions, specifically big cats, otters, and numerous birds and herps. The husbandry and management practices used in training demonstrations with crocodilians and snakes in SNZP's collection were mentioned as a highlight by numerous GBAAZK attendees. GBAAZK members found themselves inspired to pursue more training with reptiles under their care and find more time for new and different training with their current primary animals. GBAAZK keepers have also applied aspects of the training seen at Great Cats to training with the cats in MI's collection. The different management practices between the large group of otters housed at SNZP and the small group at MZiB was mentioned as a unique learning experience by The Maryland Zoo in Baltimore keepers. New enrichment options were borrowed as well. Heads of romaine lettuce and shredded paper for birds were seen at SNZP's Bird House and have since been applied with success to birds at MZiB.

While the behind-the-scenes look was invaluable for the care of similar species, learning about the species the two facilities did not share proved a joy as well. The research and conservation practices undertaken with species such as coral, naked mole rats, and maned wolves were of great interest to GBAAZK members. The collection and breeding of coral from Puerto Rico was cited as a unique practice performed by SNZP keepers. The research undertaken with naked mole rats associated with their resistance to cancer was mentioned by numerous GBAAZK attendees and the opportunity to get near the maned wolves was described as a "once in a lifetime" experience.

NCAAZK had the next exchange taking place in February and March of 2013. However, one key difference existed in their exchange. While only GBAAZK members went to Smithsonian National Zoo,

SNZP management requested that all keepers, not just NCAAZK members, have the opportunity to take part in the exchange since they had already assisted with the exchange. The MZiB had tours of the African Watering Hole, Polar Bear Watch, Rock Island, Project Golden Frog, Maryland Wilderness, Chimpanzee Forest, Giraffe House, and Embassy.

While fewer keepers were able to schedule their visit on days with species similar to theirs, ideas and observations were still obtained by SNZP keepers. Panda and bear keepers noted the similarities and differences in the care of their animals and the polar bears in MZiB collection. The training of the chimpanzees, cheetah, and zebras were described as being a unique learning experience by many keepers due to the work with multiple animals at once and with the training tools used throughout all species. Corrugated tubes, a popular and widespread enrichment item used at MZiB, were a new and applicable item that SNZP staff hopes to add to their enrichment repertoire.

Just as the case was with GBAAZK members, staff with NCAAZK's exchange found observing the work with different species to be worthwhile. The successful breeding and management of large collections of African penguins and Panamanian Golden Frogs were mentioned by numerous SNZP employees. They noted the interesting set-up of the species and imitation of natural environments provided, and its positive effect on their health, breeding, and rearing success. The reticulated giraffe, okapi, and white rhinos were described as highlights for their size, uniqueness, and conservation messages.

The keeper exchange program between the National Capital and Greater Baltimore Chapters was proposed as a way to build relations between Chapters and facilitate professional development in their members. By building a deeper understanding of the science that is animal care and the different way institutions go about this care, everyone involved has gained more knowledge of what our careers entail. The connections made with this exchange have provided benefits already and will only become more helpful as time progresses. The exchange has also helped establish constant communication between the Chapters to work together on new ideas. However, encouraging further networking from other staff will only further involvement in new collaborations and established ones; both NCAAZK and GBAAZK serve as founding Chapters for Chopsticks for Salamanders (<http://www.chopsticksforsalamanders.org/>). Every goal set for this exchange program was reached or surpassed and hopefully will encourage other Chapters to pursue similar programs to improve the care for our animals and the knowledge in our community. 🐢

A Prehensile-tailed Porcupine at SNZP is fed by a MZiB staff member (Photo by MZiB staff)



Success In Voluntary Blood Draw Training Using A Proactive Program

By Laura Laverick, Theresa Larson and Emily Gertiser
Primate Keepers, Cameron Park Zoo
Waco, Texas

ABSTRACT

When caring for apes in captivity, the most useful tool in terms of their health care is a strong training program. The list of behaviors and voluntary procedures that are possible are limitless. The Cameron Park Zoo in Waco, Texas houses 2.1 orangutans, 1.1 Bornean (*Pongo pygmaeus*) and 1.0 Hybrid (*Pongo pygmaeus x abelii*). A successful training program has been implemented using only positive reinforcement techniques. Body presentations, urine collection, ultrasound, intramuscular injection, as well as desensitization to various medical items like thermometers and stethoscopes are all components of the maintenance behaviors performed with the orangutans. Moving forward to advance proactive health care of these apes, a blood sleeve was installed for voluntary blood draw training in May 2013. In a relatively short period of time, a sufficient amount of blood was successfully collected to perform a complete blood count and serum chemistry panel on both of the adult male orangutans. The blood draw on "Kerajaan" was successful at exactly three months and on "Mukah" at four and a half months. The set up and training process for this behavior are what led to these quick and productive accomplishments with the males, along with continued progress with "Mei," the female.

BLOOD SLEEVE SET UP

One sleeve is used for all of the orangutans, male and female. The sleeve is made of two-inch by two-inch mesh. It is 38 inches in length, 7½ inches in height and 7½ inches in width. The sleeve is secured to the stall mesh through a framed port that is 12½ inches square with the actual opening inside the frame being a ten-inch square (Picture 1).

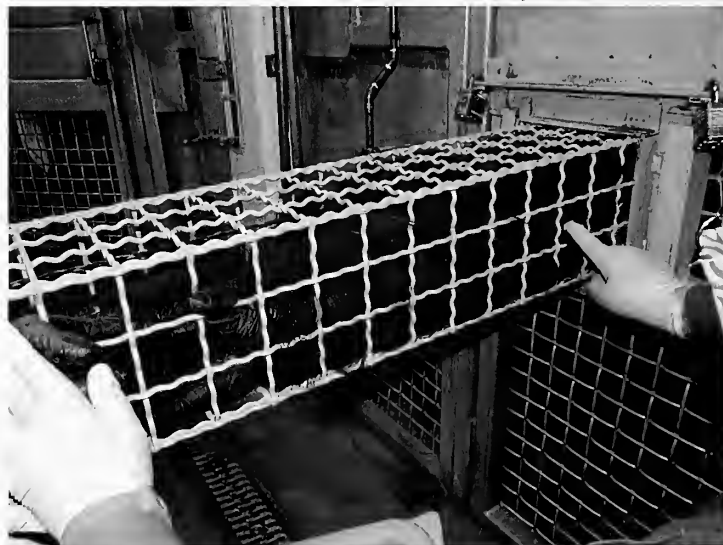
There are a number of benefits in using this type of full mesh sleeve over the more common PVC sleeve (Picture 2). The open mesh allows keepers to access various parts of the arm from any angle. This makes finding the vein easier without having to reposition the orangutan's arm. The openness of the mesh permits the orangutans to see what is being done at all times. This accelerated training because the orangutan's seemed to be more comfortable as trainers progressed through the shaping steps. The mesh sleeve also provided increased safety for the trainer while performing this procedure. There is no large opening that the orangutan can reach his/her arm out of and it is easier to see the orangutan's arm.

The mesh design provides flexibility in training approaches because

Picture 1: Blood Sleeve Set Up with Mukah Modification. Photo by Laura Laverick



Picture 2: Grab it and Inside Behavior. Photo by Kels Kaiser



modifications can be made for individual orangutans. For “Mukah”, our hybrid male orangutan, modifications were made to aid him holding his arm position for the blood draw. His arm placement is slightly different while in the sleeve and therefore a section of halved PVC pipe was added via nuts and bolts. This moved his arm closer to the mesh for the vein to be reached (Picture 1). It was also easily removed or readjusted from the bottom or either side.

TRAINING STEPS

Step 1: Desensitize to the sleeve by giving the orangutans their diets and treats in the sleeve until they were comfortable reaching in and out to different lengths. Their “fingers” behavior, which was an already established behavior, was then utilized, getting the orangutan to put their fingers in various positions throughout the sleeve.

Step 2: Teach, “Grab It”. The orangutan must have a good hold on the mesh at the end of the sleeve. Increasing the holding time period longer preventing them from just grabbing and letting go. The trainer would keep one hand on the top/outside of the orangutan’s grasped hand so that any movement could be detected as soon as possible.

Step 3: Once “Grab it” was established, “Inside” was shaped. This behavior consists of the orangutan pressing their forearm up against the mesh in the area of the vein (Picture 3).

Step 4: Once this position was established, a secondary safety person was brought in. This person is responsible for assuring the orangutan continues to have a firm hold in the desired position so that the trainer can focus on the orangutan while also making sure that nothing comes within the orangutan’s reach. At this point in the training, all the cues and communication with the orangutan came from the primary trainer to lessen confusion for the orangutan.

The Role Of The Safety Person: Once the primary trainer had the orangutan in the desired position, he/she would tell the safety person a verbal “ready”. After this was communicated, the safety person would replace the trainer’s hand with their own on top of the orangutan’s grasped fingers (Picture 4). The trainer was now able to focus on desensitizing the orangutan’s arm for the actual blood collection. If the orangutan started to lessen their grip or hold, the safety person would tell the trainer “they’re moving” to indicate they were wiggling the fingers or starting to ungrasp. If the orangutan let go, the safety person would simply say “break” allowing all personnel to remove themselves from possible harm’s way. When this was communicated, the trainer would re-cue and position the orangutan and then pass them back off to the safety person. The safety person would hold the previous mentioned responsibilities until the orangutan had been bridged and then they were free to release their physical contact.

Step 5: Desensitize the orangutan’s arm to gauze, alcohol, blunted needles, sharp needle sticks, etc. (Picture 5).

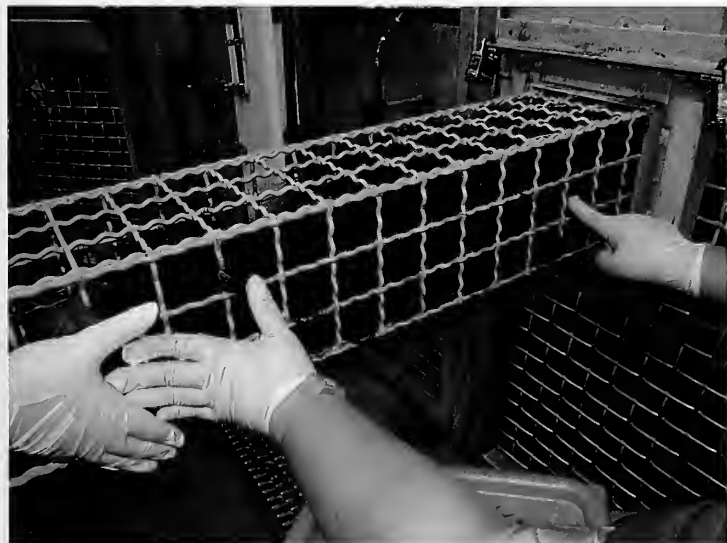
Step 6 and Final Step: Incorporate a veterinarian or veterinary assistant to work on doing the actual desensitization to the gauze, butterfly needles, and drawing blood.

The orangutan was usually given a continuous reward from the primary trainer while the veterinarian or veterinary assistant was working on their arm. It was discovered however, that the orangutans held better and appeared less nervous when they could actually just hold and watch the procedure on their arm and then get a large reward at

the end. An overall hold of about five to seven minutes was worked up to for each repetition. Most sessions were not more than two or three repetitions. Over the three month training period, one to two sessions were done per week. Sessions varied so that the orangutans did not associate working in the sleeve with attempted venipuncture every time and no more than one venipuncture was performed per week to prevent the formation of scar tissue.



Photo 6: (L to R) Dr. James Kusmierczyk, Kerajaan, Krista Havecker-Seeburger, Laura Laverick.
Photo Credit: Emily Gertiser



Picture 3: Passing off to the Safety Person. Photo by Kels Kaiser



Picture 4: Desensitizing to a Needle Stick. Photo by Kels Kaiser

SUCCESS!


Using these training steps, Cameron Park Zoo has been successful to different degrees with all of the orangutans. In exactly three months, 5 milliliters of blood was collected to run a complete blood count and serum chemistry panel on the adult male Bornean orangutan, "Kerajaan" (Picture 5). In four and a half months, 6 milliliters of blood was collected to run a complete blood count and serum chemistry panel on the adult male hybrid orangutan, "Mukah." A dry stick has been worked up to with the Bornean female orangutan, "Mei" (who has a severe needle phobia). It is believed that the sleeve, set up, and training plan, along with Cameron Park Zoo's supportive staff, is what led to the great accomplishments with the voluntary blood draw training.

MOVING FORWARD

Having blood draw training in place is a huge asset as it can be a tool in monitoring health of aging apes in captive care due to the fact that cardiac related disease is a serious concern in the ape population. This training will continue with all of the orangutans, as a maintenance behavior with the males and shaping will continue with the female. There are hopes that in the near future a blood sample will be collected on "Mei." The sleeve is also being used to start training for voluntary blood pressure readings. Cameron Park Zoo is on the next order for a Tuff Cuff through the Great Ape Heart Project based out of Zoo Atlanta. It is exciting to continue to push the training envelope and be proactive with a successful program to better the care of the three orangutans housed at Cameron Park Zoo!

ACKNOWLEDGEMENTS

The authors would like to thank Dr. James Kusmierczyk (*Head Veterinarian*), Krista Havecker-Seeburger (*Senior Mammal Keeper/Vet Assistant*), Cameron Park Zoo Management, Gary Kilpatrick (*Building Maintenance Supervisor*), Austin Turner (*Grounds Service Provider*) and Kels Kaiser (*Primate Intern and Photographer*).

This paper was presented at both ABMA in Dallas April 2014 and the Orangutan SSP Conference in Houston October 2014. 

WE WANT TO HEAR YOUR TRAINING TALES

the good, the bad and the fabulous!

Please submit your "Training Tales" and experiences in operant conditioning to share with *Animal Keepers' Forum* readers. This opportunity provides a convenient outlet for you to exhibit your training challenges, methods and milestones with the AAZK member network.

Please submit entries based on the following guidelines:

a) Submit a brief description of a training project at your facility. These can be 500 words or less, in text or bullet points – it can be longer (up to 1000 words); however, short and simple descriptions with a few images are just as perfect. Details should include the following:

1. Define the training goal (what did you try to do and for what purpose?)
2. List important steps (How did you do it – include plans that changed along the way/what worked & what didn't work)
3. Timeline used (how long did it take)
4. Tips you learned along the way

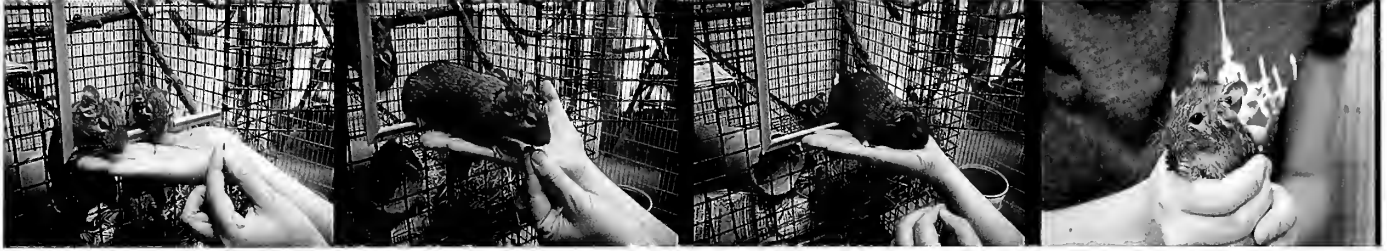
b) Include 3-5 digital photos that clearly depict the animal in the learning process or performing the desired goal (provide photo caption and photographer of each image).

Photos need to be 300 dpi and at least 1200 x 1800 pixels. Please send entries or questions to: Kim Kezer at kkezer@zoonewengland.com or Shane Good at shane.good@aazk.org (use Training Tales Submission as the subject).

BHC Comments by Kim Kezer

This submission defines how the keepers at the Cameron Park Zoo incorporate a "Safety Person" while training for a complex blood draw behavior. Animal Care staff's daily interactions with animals can put a person at risk of injury. When taking blood, for example, the veterinarian, technician or keeper must focus on the task at hand rather than being concerned if the animal will break from position. There must be confidence in the animal to maintain the behavior as well as a trust with the trainers working with the animal. Everyone involved in the procedure at the time must work together to ensure the safety and success in what you want to accomplish. When multiple people are participating in a training session, it is important to have a dialogue in place to facilitate communication among those involved, with specific roles and cues to increase safety for all involved. It is easy to become complacent or easily distracted, or have unnecessary chatter, so designating specific roles and cues will help to keep everyone focused.

A key point in this Tale is Cameron Park Zoo's proactive approach to animal care utilizing behavioral conditioning techniques. We are motivated to improve our ability to care for the animals in our charge. A useful point to keep in mind is to train behaviors that may be needed in the future. Plan for possible medical treatments such as wound care or eye drops before there is a medical need. Preparing an animal to accept a variety of treatments ahead of time will reduce the stress for the animal, as well as reduce the pressure we feel when we need to treat an animal as prescribed by the veterinarian. Immediate and proper treatment will speed up the healing process without impacting the relationship you have with this animal. Additionally, by training a simple behavior such as stepping onto a scale or a more complex behavior such as cardiac ultrasound or blood draws, Animal Management and Veterinary staff are able to monitor changes over time. Congratulations on your success and thank you for sharing your Training Tale.



BHC comments on October's Training Tale by Jay Pratte:

My favorite part of October's Training Tale is that someone is trying to use operant conditioning to teach animals that are generally just grabbed and handled. The training process, like everything else we try to provide for the animals in our care (naturalized, complex environments; enrichment; etc.) provides the animals with greater choice in their actions, and by utilizing reward methods we reduce stress and increase willingness to participate. I think this Tale is a shining example of how to look at our collections differently, and approach some of our smaller, less "considered", or generally grab-and-go species with a new eye to their needs.

The authors describe a flexible thought process throughout, adapting methods to the animals' natural history, hierarchy, and

how they addressed challenges to create new ideas and methods. This is the heart of what any training program needs to be. However, I think the best teaching line about training is this: "so that any individual could be handled from any location". This is great, because it is imperative to remember that if we only teach a behavior to an animal at ONE time, in ONE location, and it is done by ONE person, then those are also the parameters that the animal learns. You know you have done a great job with training a behavior if you can present the cue at various times or locations and receive the appropriate, desired response. Turning it over to other staff and making it a "maintenance" behavior ensures that the animals will be comfortable with people other than the original trainer, and sets everyone up to succeed! Great job and as always, thanks for sharing your Training Tale!

Take the AAZK Trees for You & Me Challenge. Compete for polar bears, win for your Chapter!



The Horns and Heroes Project

Mary Ann Cisneros
AAZK Conservation Committee



Think globally act locally. We have all heard it. I am sure most of you have adopted this motto in one form or another in your life. Chad Harmon of The Horns and Heroes Project certainly has - and in a most innovative way. He brought local artists together to showcase their talents and auction off their wares in the name of rhino conservation. Let me introduce you to The Horns and Heroes Project based in Orlando, Florida.

The Horns and Heroes Project "promotes a community driven art show and auction that inspires artists, collectors and enthusiasts to become conservationists and leave with the understanding of the future of rhinos." This statement from their social media page on Facebook reveals the group's intent to reach a wider audience than just career animal people. Harmon works at Disney's Animal Kingdom, but is also a trained visual artist. He wanted to bring what he loves most together: animals and art, and have the end result shine light on local artists and rhino conservation. The first Horns and Heroes Project debuted in 2012 and had painters, tattoo artists, sculptors, graffiti artists, illustrators, photographers, and special-effects artists working their magic on black rhino horn casts. These works of art were then auctioned off to the grand total of \$6000! The International Rhino Foundation (IRF) was the proud recipient of these

A. The logo for The Horns and Heroes Project No.2.

B. Emma Stamper- Raised \$400 for The Horns and Heroes Project No. 2 making bracelets

C. Terry Shistle- Re-creation of the rhino horn cast done by artist Terry Shistle for the first Horns and Heroes Project

D. Steph Sweet- Re-creation of the rhino bust done by artist Steph Sweet for The Horns and Heroes Project No.2.

E. Members (from left to right) Heidi Kneisl (Master of Ceremonies for The Horns and Heroes Project No.2), Chad Harmon (Founder of The Horns and Heroes Project), Jill Harmon (member of The Horns and Heroes Project), Phil Lacinak (Master of Ceremonies for The Horns and Heroes Project No.2)



THE HORNS AND HEROES PROJECT WAS CREATED TO HELP ENSURE THE SURVIVAL OF ALL RHINOS. INVOLVING THE EFFORTS OF THE VISIONARY TALENTS OF LOCAL AND INTERNATIONAL ARTISTS, WE WILL AID THOSE INVOLVED IN SECURING THE FUTURE OF THE SPECIES. FOSTERING A COMMUNITY SUPPORTED EVENT, WE WILL ADVOCATE AWARENESS, RAISE FUNDS AND ASSIST IN CONSERVATION EFFORTS WHILE MOTIVATING OTHERS TO JOIN IN THE FIGHT.

RHINO HORN IS NOT MEDICINE

funds and used them to purchase dogs and handlers to sniff out snares, orphaned rhino calves, and poachers.

Let's fast forward to September 18, 2014. It was another smashing night for The Horns and Heroes Project. I can say this because I was there. The chatter on the floor was that it had grown bigger and better. All I can say is that I was impressed. The room was full. There was live music on stage. People had to wriggle themselves into a practically never-ending line in order to view the 75 black rhino busts (created by SFX artist Barry Anderson) that the artists re-created as their own. There was also a long line for the raffle tickets which held the possibility of winning rhino art,


massages, tattoos and many other prizes. Additionally there was an opportunity to buy bracelets made by an entrepreneurial young lady named Emma Stamper, who so loved the rhino horn cast her mother bought her at the last event that she wanted to help save rhinos too! Her effort contributed over \$400 to the cause.

Susie Ellis from the IRF spoke to the crowd before the auction began and thanked The Horns and Heroes Project supporters for all their hard work and dedication. As for the auction, it was thrilling to watch. Artists were blown away by the response to their artwork. The Horns and Heroes Project members themselves had perpetual smiles on their faces during the bidding wars. It

was hard not to get swept up into the excitement.

Since the first event it seems the word was out. Protecting rhinos and educating the public on the state of their existence didn't just belong to animal peeps and celebrities anymore. As Mr. Harmon says, "We believe in raising not just money, but also awareness." Let me just say that both goals seem to have been accomplished, with \$22,000 raised for rhino conservation during The Horns and Heroes Project #2! The money from this year's event is going to IRF and Mara Conservancy.

I was inspired by The Horns and Heroes Project. It married two dissimilar groups and allowed them both to shine. Let Chad Harmon's passion inspire you to think outside the box in the name of conservation. Please check out The Horns and Heroes Project Facebook page at: <https://www.facebook.com/TheHornsAndHeroesProject> and stay tuned for information on The Horns and Heroes Project No. 3.

I'll leave you with this statement from Harmon: "The project was given its name for a reason. The heroes in this war are not only the dedicated rangers who risk their lives every day, but you, the dedicated supporters of the cause of saving rhinos throughout the world!" 

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African Painted Dog (*Lycaon pictus*) Enrichment

Tammy Cloutier, Research Associate, Texas A&M University, College Station, TX

Jane M. Packard, Associate Professor, Texas A&M University, College Station, TX

INTRODUCTION

Members of the African Painted Dog SSP wanted to know what works best for enrichment. Although AZA's Large Canid (Canidae) Animal Care Manual recommends diverse and frequent enrichment, it provides few details regarding implementation. Phoenix Zoo feeds whole carcasses to painted dogs, which they recommend to encourage animals to work more for their meals (Tresz, 2013). Research articles have reported on effectiveness of odor cues

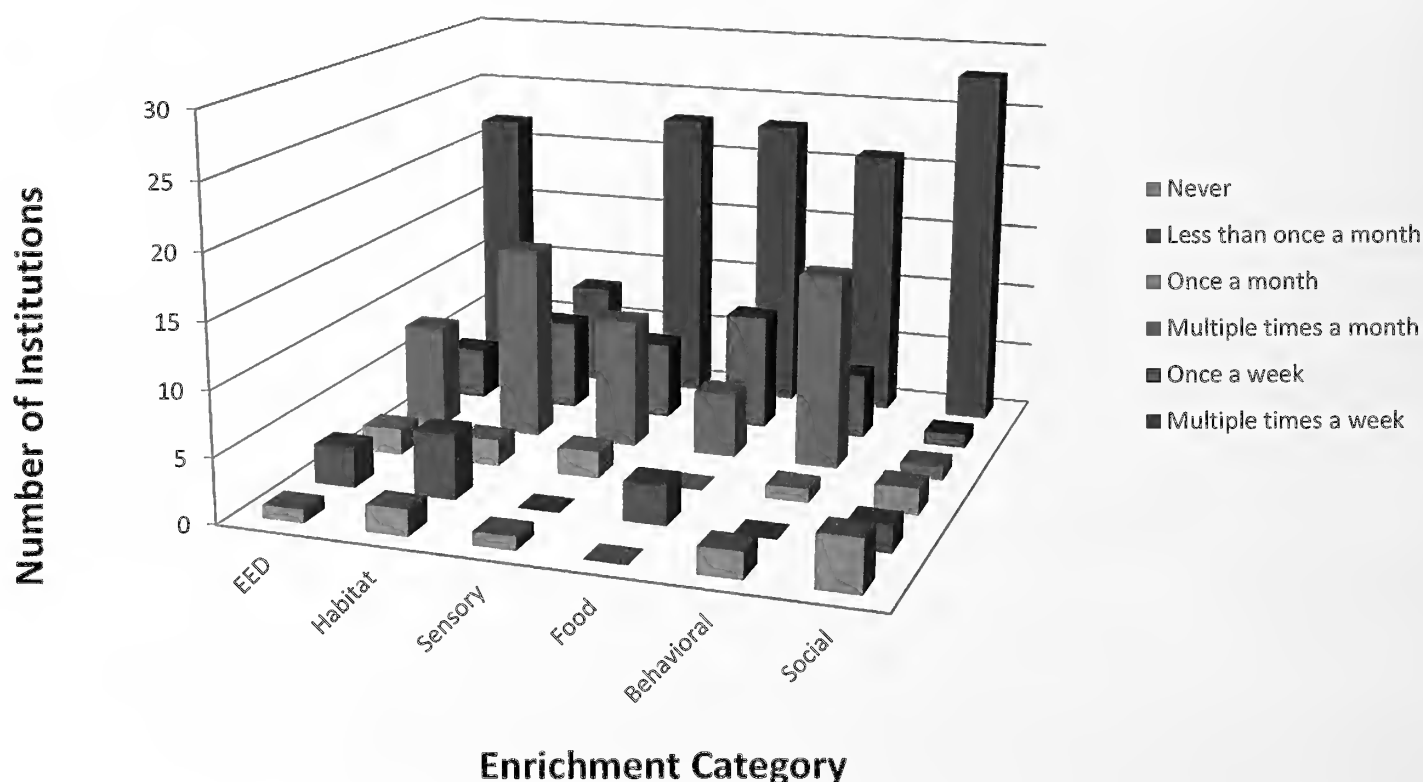
from prey feces (Rafacz and Santymire, 2014), husbandry training (Shyne and Block, 2010) and diversifying the utility of areas within enclosures (Hunter et al., 2014). However, SSP members wanted more information about (a) specific examples, (b) how often and (c) with how much success various types of enrichment were being used in the recommended categories of Environmental Enrichment Devices (EED), Habitat, Sensory, Food, Behavior Training, and Social.

IMPLEMENTATION

The SSP Coordinator distributed a questionnaire among all institutions that housed painted dogs, with a response rate of 61% (n = 23). The questionnaire was designed to be brief (to encourage response), and focused on obtaining information about social group composition, enclosures, enrichment delivery schedules, perceived success of enrichment categories and recommendations for best practices. Details on procedures for data analysis

Figure 1

Number of Institutions Reporting the Frequency for Each Enrichment Category



are reported elsewhere (Cloutier and Packard, in review).

FINDINGS

Food was perceived to be the most successful category of enrichment, followed by sensory and behavioral categories (Cloutier and Packard, in review). Respondents listed options ($n = 61$) for all six categories, including three categories perceived as least successful (EEDs, habitat and social). Although all respondents reported providing enrichment at least several times a month, most painted dogs received enrichment multiple times a week (Figure 1). All respondents reported providing food enrichment, and less than five reported never providing enrichment in the other five categories (Figure 1).

Recommended best practices were generally options that stimulated multiple senses, integrated food motivation and released naturalistic behaviors associated with hunting and/or consuming prey such as searching, chasing, tearing, chewing, digging and social interaction (Table 1). Due to the overlap among enrichment categories, we combined several categories to report results in a manner that makes more sense from a practical perspective (Table 1): (1) food and EEDs, (2) habitat and sensory stimuli, and (3) behavioral training and social groupings.

Diverse group composition provided social enrichment, but made it difficult to compare success of enrichment across groups ($n = 45$; Cloutier and Packard, in review). Only five groups included pups or sub-adults with adults. The largest group with sub-adults included eight adults, similar to an average group size in the wild. Adult mixed-sex groups were monogamous ($n = 15$), polygynous ($n = 6$), or polyandrous ($n = 9$). Single sex groups ranged from two to five individuals, similar to groups of siblings that disperse together in the wild. Only one male was alone.

The majority of both mixed-sex and single-sex groups were housed in enclosures of 1394 m² (15,000 ft²) or less (Cloutier and Packard, in review). Of the 21 reported enclosures described by respondents, 81% were described as naturalistic and 67% included concrete in some form, whether it was for a pool, holding pen, tunnels, walls, etc. Water, rocks, and different substrates were also frequently utilized in habitats, and similar environments appeared to be offered to both mixed and single-sex groups. Breeding groups did not have larger enclosures.

DISCUSSION

Respondents reported that staff and volunteers were creative and innovative in the diverse options they devised for

enrichment of painted dogs. In addition to purchased items, they used readily available materials because tearing objects apart stimulated individual and social activity, presumably analogous to the behaviors associated with grabbing and tearing apart a carcass in the wild. For these highly intelligent and inquisitive predators, variety appeared to be the key to success.

Regrettably, there is no “one size fits all” enrichment program that will meet the needs of every institution and every individual painted dog. Instead, respondents recommended a diverse “bag of tricks” to choose from and to experiment with what works best for each group considering all the individuals in the group, as well as institutional opportunities and constraints. Tresz (2013) describes effective approaches for identifying the goal of each enrichment procedure and evaluating whether the treatment reaches the target goal or needs to be modified. For example, to burn off energy, improve social bonds and reduce aggression, one institution planned to construct a lure course for the painted dogs in their care. However, a lure course might not be feasible at all institutions. Likewise, zip lines to hang enrichment options may work well in some enclosures, but not in others.



Category	Description of options	Comments
Food and manipulanda	<ul style="list-style-type: none"> • carcasses and bones • carcasses or hides attached to zip-lines • scattering, burying, or hiding food in trees or under logs • puzzle feeders, paper bags/tubes, and plastic buckets/lids • Boomer Balls®, boxes, Kongs®, various plastic toys • items that could be dragged, chewed, tugged, and used for “keep-away” and chasing play routines • paper mache containers (“piñatas” shaped like prey) provided diversion as they were ripped apart, and prolonged the search for food items hidden inside 	<ul style="list-style-type: none"> • most successful options stimulated painted dogs to work together • options manipulated by individuals had more variable success • risk of ingestion was a concern
Habitat and sensory stimuli	<ul style="list-style-type: none"> • commercial scents (e.g. perfume, spices, doe lure) • fecal material, browse and hay from ungulates • fresh branches (e.g. palm fronds) • water features such as pools and ponds • switch/rotate exhibit with other carnivores • variety of substrates (sand, mulch) and substances (grass clippings, leaf piles) stimulate digging and rolling • stacking and moving logs stimulates exploration 	<ul style="list-style-type: none"> • more response to commercial scent than prey scent • most enclosures had a variety of substrates • any change stimulated activity
Behavioral training and social groupings	<ul style="list-style-type: none"> • target-training such as open-mouth, shift, scale, paw, stand, down, hand-injection training. • on and off-exhibit; public demonstrations • separate individuals for training or feeding • group feeding may reduce aggression • pups and sub-adults stimulate social interaction and play 	<ul style="list-style-type: none"> • predators are intelligent learners • choice of individual or group training depended on group dynamics

Table 1

Tresz (2013) emphasized the need to collect data on each presentation of enrichment options, so the animal care team can decide what is most effective to address their specific objectives for behavioral modification.

We identified several barriers to generalizing beyond the observations recorded for a small number of groups, as has been done in the published literature (Rafacz and Santymire, 2014; Shyne and Block, 2010). First, the criteria for defining what is successful is “in the eye of the observer”. We defined success as increasing activity and species-specific behaviors (e.g. hunting) while reducing problem behaviors (e.g. stereotypies). In practice, our respondents seemed to use a much more intuitive set of criteria because they had to integrate different needs and results across the wide diversity of groups for which they cared. None mentioned stereotypies as a problem, although several mentioned enrichment as useful to reduce problems with social aggression. Second, from the examples that our respondents provided in the six categories of enrichment, we could see that the categories were not well defined and there was ambiguous overlap. For example, a Kong® both provides food and is an object that can

be manipulated. For future reference, Tresz (2013) provides clear definitions and examples for the six categories of enrichment options. However, in the design of future studies to more systematically evaluate the effectiveness of enrichment options for painted dogs, we recommend using the three categories defined in Table 1.

This study reported on perceptions of the relative success of six categories of enrichment options for painted dogs. Perceptions influence choice of options used on a regular basis, therefore actual practice in delivery of enrichment options. However, we caution against believing that perception is the same as reality, until enough data have been collected to answer the key question “what do measurable outcomes tell us about which are best practices?”. Ideally, institutions with similar enrichment goals for packs of similar age/sex composition would compile evidence to assess what works best under specific sets of conditions, and share their results within the African Painted Dog SSP network.

CONCLUSIONS

1. Although all institutions reported offering enrichment at least multiple times per month, most institutions offered enrichment multiple times per week.
2. Food was perceived as the most successful enrichment category, followed by sensory and behavioral.
3. Since there was high variation in responses to enrichment by individual animals, and groups, we recommend finding ways to be innovative, flexible and to experiment with what works for painted dogs at each institution.

ACKNOWLEDGEMENTS

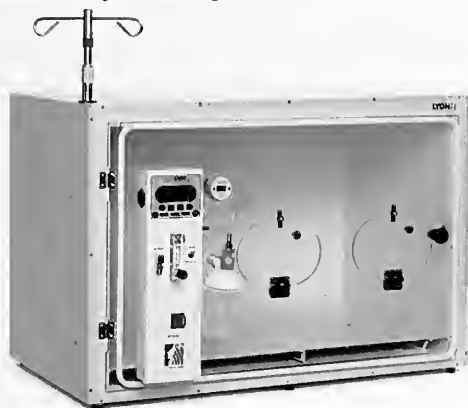
We would like to thank Joe Greathouse, Susan Greathouse, Mike Quick, Juston Wickham, as well as participating institutions: ABQ BioPark, Binder Park Zoo, Birmingham Zoo, Brookfield Zoo, Denver Zoo, Endangered Wolf Center, Gladys Porter Zoo, Good Zoo at Oglebay, Houston Zoo, Kansas City Zoo, Knoxville Zoo, Living Desert, Los Angeles Zoo, Oregon Zoo, Phoenix Zoo, Potawatomi Zoo, Roger Williams Zoo, San Antonio Zoo, Sedgwick County Zoo, The Wilds, Toledo Zoo, Topeka Zoo, Zoo New England.

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